19) **FEDERAL REPUBLIC OF GERMANY**
/LOGO/
GERMAN PATENT OFFICE

12) **First Publication**

11) **DE 37 42 927 A1**

51) Int. Cl[4]:
A 45 C 15/00
A 45 C 11/24
A 61 M/ 5/14

21) File reference: P 37 42 927.2
22) Application date: 12/18/1987
43) First publication date: 07/06/1989

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54) Carrying case

Envisioned is, for the purpose of simple and safe transport, a carrying case, in particular a carrying case for storing receptacles containing infusion fluids such as blood substitutes, that is equipped with an internal shell (6), arranged inside the carrying case, which leaves a space (7) between the shell and the walls of the case (5) and is intended to house the receptacles (8) containing the infusion fluid, while the space (7) between the walls of the carrying case (5) and the shell (6) is filled with an insulating material (7'), and at least one electric heating (14) and/or cooling element (15) is envisioned inside the shell (6).

FEDERAL PRINTING OFFICE 05. 89 908 827/72 6/60

Description

The invention relates to a carrying case, in particular to a portable case for storing receptacles that contain infusion fluids such as e.g. blood substitutes.

The frequent difficulties associated with the mobile use of infusion fluids are a well known fact in the art. Furthermore, the temperature differences between the infusion fluid and the body temperature of the injured person occurring during the transport of the fluid require implementing awkward and time-consuming temperature adjustments, in particular the heating or cooling of the infusion fluid.

Thus, it is the subject-matter of the current invention to provide a carrying case that will make the transport of receptacles containing infusion fluids simpler and safer.

According to the invention this objective is achieved by arranging a shell inside the carrying case, leaving a space between the shell and the walls of the carrying case, that will provide room for storing the receptacles containing the infusion fluid. The space between the walls of the portable case and the shell is filled with insulating material. And the shell is equipped with at least one electric heating and/or cooling element. The shell can be realized as one piece, with said piece having the shape of a saucepan, or as a bottom part that is arranged in the bottom part of the carrying case and a top part that is attached to the lid of the portable case. When the lid of the case is closed the two parts are covered tightly by the lid or they come to lie in leak-proof proximity to each other. The applied insulating material can be in the form of plastic granules and/or slab forms, and/or in the form of a plastic foam that can be hardened and/or polymerized. With the portable case it is possible to store and transport the infusion fluids that are contained in the receptacles, e.g. bags or bottles, at predetermined temperatures, thereby eliminating any loss of time due to complicated temperature adjustments.

In realizing the carrying case it is envisioned that a resistance hot plate should function as the heating element, preferably controllable with a thermostat inside the carrying case. The resistance hot plate can have storage effectiveness, allowing it to maintain predetermined temperatures for a longer period of time even if the power supply is interrupted. It is most practical if the heating element and/or cooling element can be connected with an internal source of electric power that is arranged adjacent to the shell inside the portable case. The source of electric power can be realized as an exchangeable or as a rechargeable power supply. If a rechargeable source of electricity is used, a loading device that is arranged inside the carrying case can be applied. It can be connected with the line power or with the source of electric power of an automobile via electric connections. Suitable spaces for receiving the electric switch gear and controlling means, the electric power source and the heating and cooling devices are realized inside the carrying case and located adjacent to the shell. A Peltier element and/or absorber device are envisioned as cooling element upon realization of the portable case.

According to the invention it is envisioned that optionally either separate receptacles containing the infusion fluid are placed inside the shell, which can be removed individually for use, or

receptacles containing infusion fluid that are connected with each other and can be hooked up to an internal or external pumping device including hose system are used.

It has also proved advantageous if the device that transports the portable case, such as e.g. an ambulance, is equipped with a strap-down holding device that will receive the case. This holding device is equipped with electric coupling elements in order to connect the vehicle battery with the electric ports of the energy supply of the carrying case. Upon removing the case from the holding device, most suitably the ports can be automatically sealed off by way of a locking element that is arranged on the carrying case. This will prevent moisture and dirt particles from penetrating the port elements and/or the portable case.

Finally, the user shall have the opportunity to monitor the temperature of the infusion fluids. Consequently, a sensor can be envisioned that contacts the infusion fluid and/or the receptacles or the shell.

In addition, a suitable realization of the carrying case can also be achieved if the top part and the bottom part of the carrying case are connected in such a way that they can be folded ensuring that the case is leak-proof. Snapable locking parts envisioned on the bottom part of the case as well as the top part of the lid allow anchoring the two parts of the portable case in relation to each other, thus ensuring the safe transport of the case.

Using an embodiment the invention is subsequently illustrated in more detail. Shown are in

figure 1 a perspective view of a carrying case in the opened position, in

figure 2 a top view of a bottom part of a carrying case, in

figure 3 a part of a carrying case in accordance with a modified realization, and in

figure 4 a partial section of a carrying case.

In figure 1 and in figure 2 the designation 1 refers to a bottom part of a carrying case, and the designation 2 refers to a top part of a carrying case that is attached to the bottom part 1 by way of a swingable hinge 3. The top part of the carrying case 2 can be snapped shut to the bottom part of the carrying case 1 using the locking elements 4, 4'. The bottom part of the carrying case 1 houses a saucepan-shaped shell 6, leaving a space between the shell and the walls of the case 5, which, preferably, can be tightly covered when the top part of the carrying case 2, which serves as a lid, is swung down. The space 7 between the shell 6 and the walls 5 of the bottom part of the carrying case 1 is filled with an insulating material 7', e.g. plastic granules. The shell 6 is used to store a number of receptacles 8 containing infusion fluids, such as e.g. blood substitute or saline solution. The receptacles 8 consists of bags or bottles that can be freely inserted into the shell and/or fastened inside the shell with clamping elements (not shown). A pressure compensation valve 10 connects the inside area 9 of the shell 6 with the surrounding air. In the embodiment the shell 6 receives two electric hot plates 14, in particular these are hot plates with storage capacity. The receiving areas 11, 12, suitable for a source of electric power 13 and for electronic switching gears and controlling devices 15, are envisioned adjacent to the shell 6. The hot plates 14 are connected with the electric power

source 13 via electric conductors, in particular in such a way that a predetermined temperature of e.g. 38°C is permanently maintained via the controlling device 15. This means the predetermined temperature is also maintained during the time it takes to transport the receptacles 8. According to the invention an additional cooling element 16, e.g. a Peltier element, can be arranged inside or allocated to the shell 6. The cooling element 16 is connected with the electric source of power 13 and is able to achieve a predetermined temperature, such as 38°C, by cooling the inside area of the shell. A loading device 18 for the source of electric power 13 is housed in another receiving area 17 and connected, using conductors, to the ports 20 for a hookup with the supply main. A carrying handle is identified with the designation 19.

In the embodiment in figure 1 and in figure 2 the receptacles 8 are placed independently of each other inside the shell 6, but it is also possible to connect the receptacles with each other using hose lines (not shown) in order to subsequently remove the infusion fluids from the receptacles by way of a pumping system (not shown). For this purpose a sterile hose can be connected to the pumping system. This hose can also be stored inside shell 6 or in a separate receiving area 23.

The bottom part of the carrying case 1 and the top part of the carrying case 2 are connected with each other most suitably in a water-proof fashion. This will prevent fluids from penetrating the shell 6. The pumping system can consist of a centrifugal pump or of a diaphragm pump.

The carrying case can be transported in any way, either manually and/or anchored inside a holding device in a carrier vehicle (not shown). Inside a carrier vehicle the carrying case is hooked up, respectively, via the ports 20 with the electric connector elements that are realized in the holding device and that are connected with the electric power source of the vehicle.

The bottom part of the carrying case 1 and the top part of the carrying case 2 in figure 4 house are equipped respectively with shell parts 6' and 6" in order to form the shell 6. Upon swinging the top part of the carrying case 2 down the two parts form in conjunction a tightly closed shell 6.

Closed walls are used in figure 1 and in figure 2. In the embodiment in figure 3 however, the bottom part of the carrying case 1 and/or the top part of the carrying case 2 are realized with frame racks 21 that hold the inserted wall plates 22.

Patent Claims

1. Carrying case, in particular for the storage of receptacles containing infusion fluids, e.g. blood substitute, wherein a shell (6) is arranged at a distance to the walls of the carrying case (5) inside this carrying case, and the shell is envisioned to receive the receptacles (8) containing the infusion fluids, and the space (7) between the walls of the carrying case (5) and the shell (6) is filled with insulating material (7'), and the shell (6) contains at least one electric heating (14) and/or cooling element (16).
2. Carrying case as claimed in claim 1 wherein the shell is formed by a bottom part (6') arranged in the bottom part of the carrying case and a top part (6") arranged in the top part of the carrying case, and when

the carrying case is closed the top and bottom parts of the shell are tightly placed against each other, or they are connected with each other.

3. Carrying case as claimed in claim 1 wherein granules, slab form or a plastic foam that can be hardened or polymerized serve as insulating materials.
4. Carrying case as claimed in claim 1 wherein the electric heating element (14) consists of a resistance hot plate and is controllable using a thermostat inside the carrying case.
5. Carrying case as claimed in claim 1 and claim 4 wherein the heating element (14) and/or the cooling element can be connected to a source of electric power (13) that is arranged inside the carrying case adjacent to the shell (6).
6. Carrying case as claimed in claim 5 wherein the source of electric power (13) for the heating element (14) and/or the cooling element can be connected with an electric loading device (18) that is located inside the carrying case.
7. Carrying case as claimed in claim 1 and claim 4 wherein the heating element (14) and/or the cooling element can be connected to a source of electric power that is outside of the carrying case.
8. Carrying case as claimed in claim 1 wherein a Peltier element or an absorber element serves as a cooling element.
9. Carrying case as claimed in claim 1 wherein an optical or acoustical signal device is arranged on the apparatus for the purpose of displaying any deviations or changes with respect to the desired and the actual temperatures inside the shell.
10. Carrying case as claimed in claim 1 wherein the temperature of the infusion fluid is monitored using a display with sensor.
11. Carrying case as claimed in claim 1 and claim 2 wherein a pressure compensation valve (10) permanently connects the inside area of the shell (6) with the surrounding air.
12. Carrying case as claimed in claim 1 wherein a strap-down holding device for the carrying case inside the transport equipment or vehicle is equipped with electric coupling elements in order to connect the energy supply of the portable case for the heating and cooling elements.
13. Carrying case as claimed in claim 12 wherein the port elements (20) of the portable case can be automatically sealed off by way of a locking element arranged on the case when the carrying case is removed from the holding device.
14. Carrying case as claimed in claim 1 wherein the receptacles (8) containing the infusion fluids are connected individually or jointly to an internal or external pumping device including hose system.
15. Carrying case as claimed in claim 1, 5, 14 wherein a receiving area (11, 12) is realized adjacent to the shell (6) for the electric switch gear and controlling means (15), as well as for the source of electric power (13) for the heating and/or cooling elements.
16. Carrying case as claimed in claim 1 wherein receiving areas are realized adjacent to the shell (6) for the electric switch gear and controlling means (15), the source of electric power (13), the loading device (18) and for a pump intended for the infusion fluids.

17. Carrying case as claimed in claim 1 and claim 2 wherein the top part of the carrying case (2) and the bottom part of the carrying case (1) can be folded, and they are connected in a way as to prevent fluid leakage.
18. Carrying case as claimed in claim 1 wherein the walls (5) of the bottom part of the carrying case (1) and/or of the top part of the carrying case (2) are realized using frame racks (21) that are equipped with wall plates (22) which extend across the open middle sections and are connected to the racks (21).
19. Carrying case as claimed in claim 1 wherein a saucepan-shaped shell (6) is arranged in the bottom part of the carrying case (1) whose open side can be tightly locked using the top part of the carrying case (2) when that part, which is hinged to the bottom part of the carrying case (1), is swung down.

Number: **37 42 927**
Int. Cl.[4]: **A 45 C 15/00**
Application date: Dec. 18, 1987
First publication date: July 6, 1989

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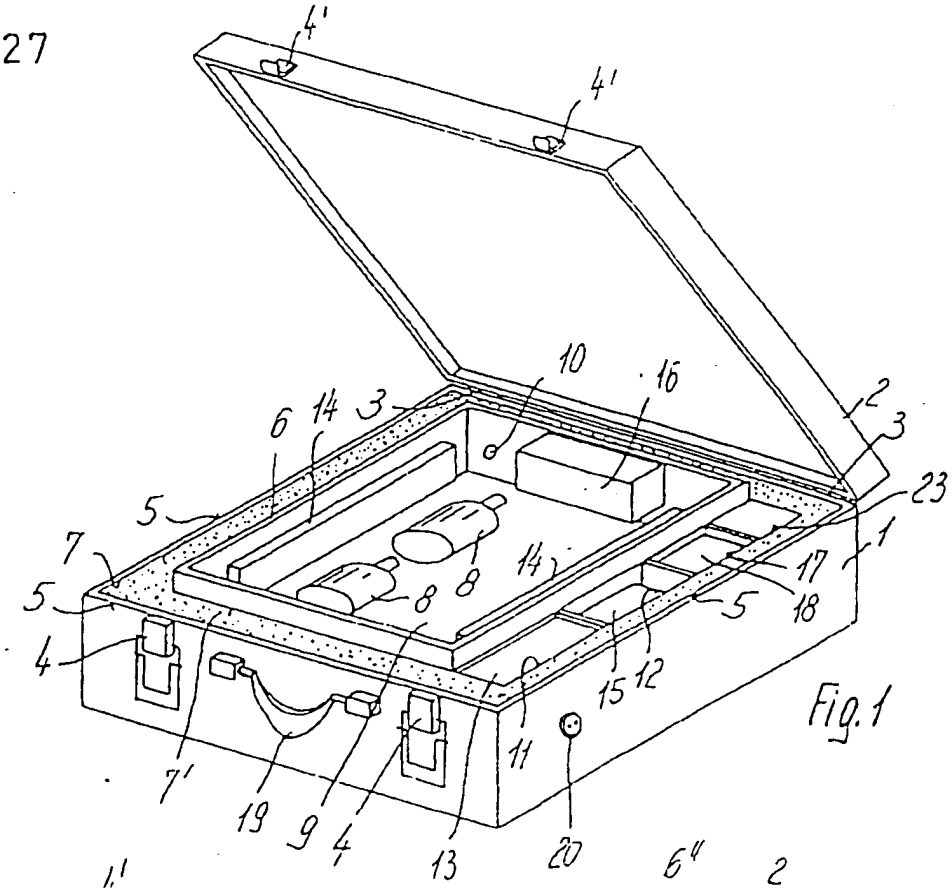

Fig. 1

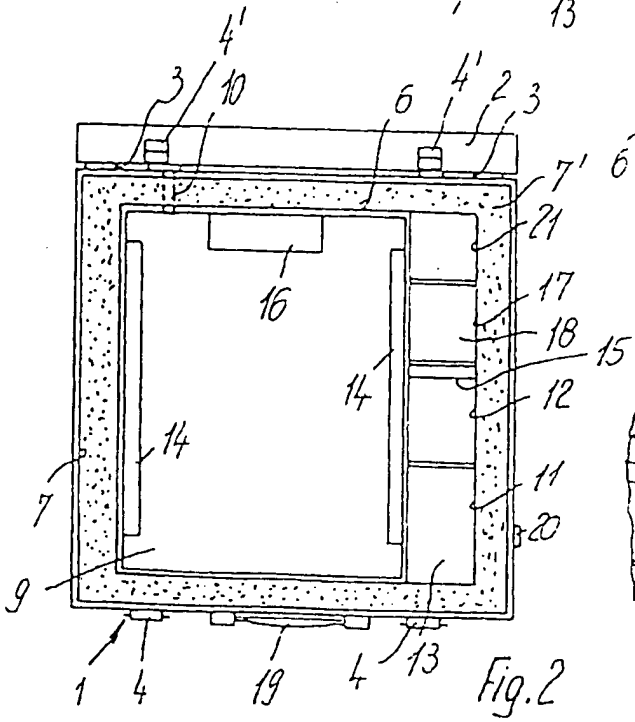

Fig. 2

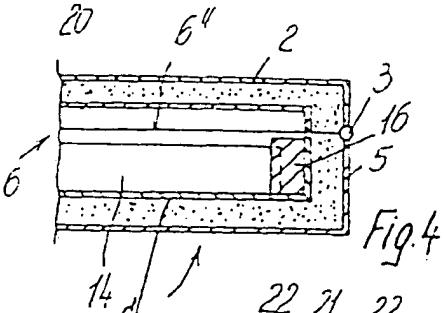

Fig. 4

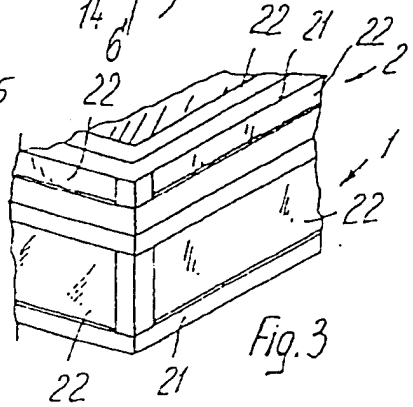

Fig. 3